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Date: March 12, 2012 Signature: /Alyssa Ann Finamore/

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Appl. No. : 10/593,053 Confirmation No. 7242  
Applicant : Jianglei Ma, et al.  
Filed : September 15, 2006  
TC/A.U. : 2474  
Examiner : Christopher P. Grey  
  
Docket No. : 77682-555  
Customer No. : 07380

**MAILSTOP AF  
EXPEDITED HANDLING REQUESTED**

Commissioner for Patents  
Alexandria, VA 22313-1450  
U.S.A.  
Dear Sir:

**APPELLANT'S BRIEF UNDER 37 C.F.R. 41.37**

The following is the Appellant's Brief, submitted under the provisions of 37 C.F.R. 41.37. A Notice of Appeal for the above-identified application was filed on October 20, 2011. The fee of \$620 that is required by 37 C.F.R. 41.20(b)(1) for filing the Notice of Appeal was submitted on that same date. With regard to the fee of \$620 that is required by 37 C.F.R. 41.20(b)(2) for filing a brief in support of the appeal, the fee is being submitted simultaneously with this Appeal Brief.

**Table of Contents**

<u>Real Party in Interest</u>	page 3
<u>Related Appeals and Interferences</u>	page 4
<u>Status of Claims</u>	page 5
<u>Status of Amendments</u>	page 6
<u>Summary of Claimed Subject Matter</u>	page 7
<u>Grounds of Rejection to be Reviewed on Appeal</u>	page 8
<u>Argument</u>	page 9
<u>Claims Appendix</u>	page 16
<u>Evidence Appendix</u>	page 24
<u>Related Proceedings Appendix</u>	page 25

**Real Party in Interest**

The real party in interest is the assignee of record, i.e. Rockstar BIDCO, LP, current address: 1285 Avenue of the Americas, New York, New York, 10019-6064, USA.

**Related Appeals and Interferences**

There are no related appeals or interferences that will directly affect, be directly affected by, or have a bearing on the present appeal.

**Status of Claims**

Claims 1, 2, 4, 5, 20, 24 to 26, 46, 47, 53 to 73 are currently pending in the application.

Claims 3, 6 to 10, 14, 17, 21 to 23, 28 to 45 and 48 are previously cancelled.

Claims 11 to 13, 15, 16, 18, 19, 27 and 49 to 52 are withdrawn.

The status of the claims based on the Final Office Action issued on July 20, 2011 is as follows:

Claims 1, 2, 4, 5, 20, 24 to 26, 46, 47, 53 to 73 are rejected for reasons identified below in the “Grounds of Rejection to be Reviewed on Appeal” section.

An Appendix containing a copy of the appealed claims is attached hereto.

**Status of Amendments**

No amendments have been filed subsequent to the Final Action dated July 20, 2011. Accordingly, it is Applicant's understanding that the claims presently on file correspond to the listing of claims filed in the Office Action Response dated April 27, 2011.

### **Summary of Claimed Subject Matter**

Independent claim 1 relates to “a method of transmitting over four transmit antennas”. Such a method is supported, for example, by the first lines of the abstract as well as page 2, lines 30 to 32 and page 11, lines 13 to 15 and Fig. 1.

According to claim 1, the method comprises “for each antenna, generating a respective sequence of OFDM symbols, each OFDM symbol having a plurality of sub-carriers carrying data or pilots, and transmitting the sequence of OFDM symbols”. The sequence of OFDM symbols having a plurality of sub-carriers carrying data or pilots is described, for example, at page 11, lines 25 to 28, page 12, lines 20 to 22 and Figs. 4B, 6, 7B and 11.

The method of claim 1 further recites that the pilots are “inserted for the four transmit antennas collectively in blocks of two sub-carriers by two OFDM symbols scattered in time and frequency”. This limitation is supported, for example, by the description at page 14, lines 3 to 16, page 17, lines 1 to 28, page 17, line 29 to page 30, line 3, page 25, lines 6 to 17, and Figs. 4B, 6, 7B and 11.

The method of claim 1 further recites that the pilots are “inserted for at least one antenna in a grouping of at least one subcarrier of the plurality of sub-carriers for all OFDM symbols of the respective sequence of OFDM symbols”, which is supported, for example, by the description at page 15, line 16 to page 16, line 6, page 17, lines 1 to 28, page 17, line 29 to page 30, line 3, page 25, lines 6 to 17, and Figs. 4B, 6, 7B and 11.

**Grounds of Rejection to be Reviewed on Appeal**

The issues which are hereby presented for review are as follows:

1. whether claims 1, 2, 4, 5, 20, 24 to 26, 46, 53 to 63 and 69 to 72 are anticipated under 35 U.S.C. 102(e) by Ma et al. (US Patent Application Publication No. 2003/0072254, hereinafter Ma et al. '54);
2. whether claims 47, 64, 66 to 68 and 73 are unpatentable under 35 U.S.C. 103(a) over Ma et al. '54 and further in view of Ma et al. (US Patent Application Publication No. 2003/0072255, hereinafter Ma et al. '55); and
3. whether claim 65 is unpatentable under 35 U.S.C. 103(a) over Ma et al. '54 and further in view of Wallace et al. (US Patent No. 6,473,467, hereinafter Wallace).



## **Argument**

### **1. Whether claims 1, 2, 4, 5, 20, 24 to 26, 46, 53 to 63 and 69 to 72 are anticipated under 35 U.S.C. 102(e) by Ma et al. ‘54**

Controlling case law has frequently addressed rejections under 35 U.S.C. § 102. "For a prior art reference to anticipate in terms of 35 U.S.C. Section 102, **every element** of the claimed invention **must** be **identically** shown in a single reference." Diversitech Corp. v. Century Steps, Inc., 850 F.2d 675, 677, 7 U.S.P.Q.2d 1315, 1317 (Fed. Cir. 1988; emphasis added). The disclosed elements must be arranged as in the claim under review. See Lindemann Machinefabrik v. American Hoist & Derrick Co., 730 F.2d 1452, 1458, 221 U.S.P.Q. 481, 485 (Fed. Cir. 1984). If any claim, element, or step is absent from the reference that is being relied upon, there is **no** anticipation. Kloster Speedsteel AB v. Crucible, Inc., 793 F.2d 1565, 230 U.S.P.Q. 81 (Fed. Cir. 1986; emphasis added). The following analysis of the present rejections is respectfully offered with guidance from the foregoing controlling case law decisions.

Claim 1 includes the limitation that pilots are inserted "for at least one antenna in a grouping of at least one subcarrier of the plurality of sub-carriers for all OFDM symbols of the respective sequence of OFDM symbols".

The Examiner has alleged that this limitation is disclosed at paragraph [0097] of Ma et al. ‘54 in the form of the disclosure of "In high mobility applications, pilots should be included in every OFDM symbol avoiding the need for this last interpolation in time step".

Appellant submits that the limitation added in the present application defines that pilots are inserted "in a grouping of at least one sub-carrier ... for all OFDM symbols" meaning that a minimum of at least one single sub-carrier is used for inserting pilots in all OFDM symbols, in addition to the limitation recited in claim 1 of blocks of pilots in the 2 sub-carrier by 2 OFDM symbol arrangements being scattered in time and frequency.

Appellant directs the Examiner's attention to FIG. 6 as an example illustrating two particular limitations of claim 1. The limitation of pilots being inserted "for the four transmit antennas collectively in blocks of two sub-carriers by two OFDM symbols scattered in time and frequency" is illustrated as the groupings of four pilots in the 2 sub-carrier by 2 OFDM symbol

arrangements scattered throughout the two dimensional time-frequency resource. The limitation of pilots being inserted “for at least one antenna in a grouping of at least one subcarrier of the plurality of sub-carriers for all OFDM symbols of the respective sequence of OFDM symbols” is illustrated as two different groupings of pilots on two different sub-carriers (reference characters 166 and 168), in which pilots are inserted on all OFDM symbols of the respective sub-carriers.

The disclosure in paragraph [0097] of Ma et al. '54 alleged by the Examiner to disclose the limitation “for at least one antenna in a grouping of at least one subcarrier of the plurality of sub-carriers for all OFDM symbols of the respective sequence of OFDM symbols” does not disclose or suggest that pilots are inserted in a single sub-carrier for all OFDM symbols.

Paragraph [0097] of Ma et al. '54 discloses:

In some embodiments, every OFDM symbol contains some pilot insertion points and as such this completes the interpolation process. In other embodiments, there are some OFDM symbols which do not have any pilot insertion points. To get channel estimates for these OFDM symbols, an interpolation in time of the previously computed channel estimates is performed. In high mobility applications, pilots should be included in every OFDM symbol avoiding the need for this last interpolation in time step. (emphasis added)

There are multiple interpretations of what might be implied by the disclosure in paragraph [0097] of Ma et al. '54 such as the pilots may be inserted randomly in sub-carriers of a respective band of sub-carriers for each OFDM symbol, not necessarily all in a single sub-carrier for all OFDM symbols, as recited in claim 1.

For at least the reasons discussed above, Appellant submits that Ma et al. '54 does not identically disclose all the elements of claim 1, and as this is the case, Ma et al. '54 cannot be considered to anticipate claim 1.

Claims 2, 4, 5, 20, 24 to 26, 46, 53 to 63 and 69 to 72 are dependent upon claim 1, either directly or indirectly. For at least their dependence upon claim 1, Appellant submits that claims 2, 4, 5, 20, 24 to 26, 46, 53 to 63 and 69 to 72 are novel over Ma et al. '54.

## **Response to Examiner Comments in Final Office Action**

On page 2 of the Final Office Action the Examiner responds to Appellant's arguments pertaining to the 35 U.S.C. 102(e) rejection from the previous response filed on April 27, 2011. The Examiner alleges that the response was not sufficient because the arguments "amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references". Appellant submits the arguments provided above sufficiently describe why the claims are novel over the cited reference.

In view of the foregoing, Appellant respectfully submits that the Examiner's rejection of claims 1, 2, 4, 5, 20, 24 to 26, 46, 53 to 63 and 69 to 72 under 35 U.S.C. 102(e) based on Ma et al. '54 is improper. It is respectfully submitted that this is clear on its face and the Board of Patent Appeals and Interferences is requested to overturn the Examiner's rejection.

### **2. Whether claims 47, 64, 66 to 68 and 73 are unpatentable under 35 U.S.C. 103(a) over Ma et al. '54 and further in view of Ma et al. '55.**

In rejecting claims under 35 U.S.C. 103(a), the Examiner bears the initial burden of establishing a prima facie case of obviousness. *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992). *See also In re Piasecki*, 745 F.2d 1468, 1472 (Fed. Cir. 1984). It is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. *See In re Fine*, 837 F.2d, 1071, 1073 (Fed. Cir. 1988). In so doing, the Examiner is expected to make the factual determinations set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966), viz., (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; and (3) the level of ordinary skill in the art. Additionally, in making a rejection under 35 U.S.C. 103(a) on the basis of obviousness, the Examiner must provide some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. *KSR Int'l. Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007). Only if this initial burden is met does the burden of coming forward with evidence or argument shift to the appellant. *See Oetiker*, 977 F.2d at 1445. *See also Piasecki*, 745 F.2d at 1472. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. *See Oetiker*, 977 F.2d at 1445; *Piasecki*, 745 F.2d at 1472. Appellant's analysis below demonstrates that the

Examiner has failed to properly conform to the aforementioned guidelines for a finding of obviousness under 35 U.S.C. 103.

The Examiner has rejected claims 47, 64, 66 to 68 and 73 under 35 U.S.C. 103(a) as allegedly being unpatentable over Ma et al. '54 and further in view of Ma et al. '55. For reasons discussed below, Appellant submits that Ma et al. '54 and Ma et al. '55 are not citable as prior art under 35 U.S.C. 103(a), as alleged by the Examiner.

The Examiner has failed to establish a prima facie obviousness rejection against the identified claims because both of the Ma et al. references are not citable prior art. The Ma et al. references are not prior art because the Ma et al. references qualify for the exception under 35 U.S.C. 103(c)1, which provides:

Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of **section 102** of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the claimed invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Both of the Ma et al. references have a publication date of April 17, 2003, and a filing date of January 8, 2002. Thus, the Ma et al. references each qualify as references under 35 U.S.C. 102(e). Appellant submits that the present application (U.S. Patent Application No. 10/593,053) and both of the Ma et al. references were, at the time the invention of the present application was made, owned by Nortel Networks Limited. This statement alone, in combination with the present facts, are sufficient evidence to disqualify the Ma et al. references from being used in a rejection under 35 U.S.C. **103(c)** (*See* MPEP 706.02(1)(2)).

In addition to the above statement, Appellant also provides the following assignment particulars regarding the present application and Ma et al. references. The assignment pertaining to Ma et al. '54 was recorded at Reel/Frame: 012763/0796 on April 5, 2002. The assignment pertaining to Ma et al. '55 was recorded at Reel/Frame: 012773/0956 on April 5, 2002. The

assignment for the present application was recorded at Reel/Frame: 018328/0178 on September 29, 2006.

### **Response to Examiner Comments in Final Office Action**

Also on page 2, the Examiner alleges that the Appellant's arguments pertaining to the 35 U.S.C. 103 rejection are based on the 35 U.S.C. 102 rejection arguments and are therefore not sufficient to address the 35 U.S.C. 103 rejection. Appellant respectfully submits that the 35 U.S.C. 103 rejection arguments are not based on the arguments related to the 35 U.S.C. 102 rejection. The 35 U.S.C. 103 rejection arguments are directed to the statutory citability of the reference, not the subject matter of the cited reference per se.

In view of the foregoing, Appellant respectfully submits that the Examiner's rejection of claims 47, 64, 66 to 68 and 73 under 35 U.S.C. 103(a) based on Ma et al. '54 and Ma et al. '55 is improper. Appellant submits that the Examiner has failed to establish a prima facie obviousness rejection against the identified claims because neither of the Ma et al. references are citable prior art. It is respectfully submitted that this is clear on its face and the Board of Patent Appeals and Interferences is requested to overturn the Examiner's rejection.

### **3. Whether claim 65 is unpatentable under 35 U.S.C. 103(a) over Ma et al. '54 and further in view of Wallace et al. (US Patent No. 6,473,467, hereinafter Wallace)**

It is unclear to Appellant what is the current status of claim 65. On the Office Action Summary page of the Final Office Action dated July 20, 2011, it is indicated that claim 65 is objected to. On page 12 of the Final Office Action claim 65 is rejected based on 35 U.S.C. 103(a) having regard to Ma et al. '54 in view of Wallace. In the Notice of Panel Decision from Pre-Appeal Brief issued on January 12, 2012, claim 65 is not indicated to be allowed, objected to, rejected or withdrawn from consideration.

However, if the 35 U.S.C. 103 rejection is considered to be correct, Appellant submits that for the same reasons discussed above, the Ma et al. '54 reference is not a citable reference based on the exception in 35 U.S.C. **103(c)** (*See* MPEP 706.02(1)(2)).

In view of the foregoing, Appellant respectfully submits that the Examiner's rejection of claim 65 under 35 U.S.C. 103(a) based on Ma et al. '54 and Wallace is improper. Appellant submits that the Examiner has failed to establish a prima facie obviousness rejection against the identified claims because the Ma et al.'54 reference is not citable prior art. It is respectfully submitted that this is clear on its face and the Board of Patent Appeals and Interferences is requested to overturn the Examiner's rejection.

### **Conclusions**

With respect to each of the issues presented herein for review, Appellant respectfully submits that errors have been made in the rejection of the appealed claims.

Regarding the issue of whether claims 1, 2, 4, 5, 20, 24 to 26, 46, 53 to 63 and 69 to 72 are anticipated under 35 U.S.C. 102(e) by Ma et al. '54, Appellant respectfully requests that the rejection of claims 1, 2, 4, 5, 20, 24 to 26, 46, 53 to 63 and 69 to 72 be reconsidered by the Board of Patent Appeals and Interferences and overturned.

Regarding the issue of whether claims 47, 64, 66 to 68 and 73 are unpatentable under 35 U.S.C. 103(a) over Ma et al. '54 and further in view of Ma et al. '55, Appellant respectfully requests that the rejection of claims 47, 64, 66 to 68 and 73 be reconsidered by the Board of Patent Appeals and Interferences and overturned.

Regarding the issue of whether claim 65 is unpatentable under 35 U.S.C. 103(a) over Ma et al. '54 and further in view of Wallace, Appellant respectfully requests that the rejection of claim 65 be reconsidered by the Board of Patent Appeals and Interferences and overturned.

Respectfully submitted,

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## **Claims Appendix**

1. (Previously presented) A method of transmitting over four transmit antennas comprising:

for each antenna, generating a respective sequence of OFDM symbols, each OFDM symbol having a plurality of sub-carriers carrying data or pilots, and transmitting the sequence of OFDM symbols;

wherein pilots are:

inserted for the four transmit antennas collectively in blocks of two sub-carriers by two OFDM symbols scattered in time and frequency; and

inserted for at least one antenna in a grouping of at least one subcarrier of the plurality of sub-carriers for all OFDM symbols of the respective sequence of OFDM symbols.

2. (Original) The method of claim 1 wherein pilots are inserted for the four antennas collectively in blocks of two sub-carriers by two OFDM symbols scattered in time and frequency by:

inserting such blocks of two sub-carriers by two OFDM symbols scattered in a first regularly spaced pattern in even pairs of OFDM symbols;

inserting such blocks of two sub-carriers by two OFDM symbols scattered in a second regularly spaced pattern offset from said first regularly spaced pattern in odd pairs of OFDM symbols.

3. (Cancelled)

4. (Previously presented) The method of claim 1 wherein each block of two sub-carriers by two OFDM symbols comprises a single pilot for each of the four transmit antennas in a respective position within the block.

5. (Previously presented) The method of claim 4 wherein the single pilot for each of the four transmit antennas takes the same position in every block of two sub-carriers by two OFDM symbols.



6. (Cancelled)

7. (Cancelled)

8. (Cancelled)

9. (Cancelled)

10. (Cancelled)

11. (Withdrawn) A method of transmitting over four transmit antennas comprising:

for each antenna, generating a respective sequence of OFDM symbols, each OFDM symbol having a plurality of sub-carriers carrying data or pilots, and transmitting the sequence of OFDM symbols;

wherein for a first pair of the four antennas, pairs of pilots are inserted scattered in time and frequency;

wherein for a second pair of the four antennas, pairs of pilots are inserted scattered in time and frequency in locations different from pilots for the first pair of antennas.

12. (Withdrawn) The method of claim 11 wherein for each pair of two pilots, the two pilots are not consecutive in time or frequency.

13. (Withdrawn) The method of claim 11 wherein for each pair of two pilots, the two pilots are arranged consecutively in time.

14. (Cancelled)

15. (Withdrawn) A method of transmitting over four transmit antennas comprising:

for each antenna, generating a respective sequence of OFDM symbols, each OFDM symbol having a plurality of sub-carriers carrying data or pilots, and transmitting the sequence of OFDM symbols;

wherein pilots are arranged in groups of four consecutive pilots in time, each group of four consecutive pilots containing pilots for the four antennas.

16. (Withdrawn) The method of claim 15 wherein such groups of four consecutive pilots are inserted in each set of four consecutive OFDM symbols, and in each of a plurality of spaced sub-carriers.

17. (Cancelled)

18. (Withdrawn) The method of claim 15 wherein each group of four consecutive pilots comprises a single pilot for each of the four antennas.

19. (Withdrawn) The method of claim 18 wherein the location of the single pilot for each antenna varies across groups of four consecutive pilots.

20. (Previously presented) The method of claim 1 further comprising:

using different pilot patterns for respective four transmit antenna transmitters to reduce interference between pilots of different four transmit antenna transmitters.

21. (Cancelled)

22. (Cancelled)

23. (Cancelled)

24. (Previously presented) The method of claim 1 wherein the pilots inserted for at least one antenna in a grouping of at least one subcarrier of the plurality of sub-carriers for all OFDM symbols of the respective sequence of OFDM symbols comprise pilots for each of the four transmit antennas, a grouping for each antenna comprising at least one subcarrier of the plurality of sub-carriers for all OFDM symbols of the respective sequence of OFDM.

25. (Previously presented) The method of claim 1 wherein the pilots inserted for at least one antenna in a grouping of at least one subcarrier of the plurality of sub-carriers for all OFDM symbols of the respective sequence of OFDM symbols comprise pilots for pairs of two transmit antennas of the four transmit antennas, a grouping for each pair of antennas comprising at least

one subcarrier of the plurality of sub-carriers for all OFDM symbols of the respective sequence of OFDM symbols.

26. (Previously presented) The method of claim 1 further comprising transmitting at least one fixed signalling channel for each of two pairs of antennas within said four transmit antennas.

27. (Withdrawn) The method of claim 15 further comprising:

transmitting relatively reliable signalling channel information proximal in time and frequency to locations of pilots.

28. (Cancelled)

29. (Cancelled)

30. (Cancelled)

31. (Cancelled)

32. (Cancelled)

33. (Cancelled)

34. (Cancelled)

35. (Cancelled)

36. (Cancelled)

37. (Cancelled)

38. (Cancelled)

39. (Cancelled)

40. (Cancelled)

41. (Cancelled)

42. (Cancelled)

43. (Cancelled)

44. (Cancelled)

45. (Cancelled)

46. (Previously presented) A transmitter comprising four transmit antennas, the transmitter being adapted to implement the method of claim 1.

47. (Previously presented) At least two base station transceivers collectively comprising four transmit antennas, the at least two base station transceivers adapted to implement the method of claim 1.

48. (Cancelled)

49. (Withdrawn) A transmitter comprising four transmit antennas, the transmitter being adapted to implement the method of claim 11.

50. (Withdrawn) A transmitter comprising four transmit antennas, the transmitter being adapted to implement the method of claim 15.

51. (Withdrawn) At least two base station transceivers collectively comprising four transmit antennas, the at least two base station transceivers adapted to implement the method of claim 11.

52. (Withdrawn) At least two base station transceivers collectively comprising four transmit antennas, the at least two base station transceivers adapted to implement the method of claim 15.

53. (Previously presented) The method of claim 2 wherein the first regularly spaced pattern comprises a repeating pattern of two pilot sub-carriers, ten data sub-carriers and the second regularly spaced pattern comprises six data sub-carriers followed by a repeating pattern of two pilot sub-carriers and ten data sub-carriers.

54. (Previously presented) The method of claim 1 wherein each block of two sub-carriers by two OFDM symbols is divided into pilot pairs, each pilot pair being transmitted by a respective pair of the four transmit antennas.

55. (Previously presented) The method of claim 54 wherein each pilot pair is arranged sequentially in time.

56. (Previously presented) The method of claim 54 wherein each pilot pair is arranged sequentially in frequency.

57. (Previously presented) The method of claim 1 wherein pilots are inserted for the four transmit antennas collectively in blocks of two sub-carriers by two OFDM symbols scattered in time and frequency in a repeating pattern of six OFDM symbols each comprising a first, second and third pair of OFDM symbols, the method comprising:

inserting such blocks of two sub-carriers by two OFDM symbols scattered in a first regularly spaced pattern in each first pair of OFDM symbols;

inserting such blocks of two sub-carriers by two OFDM symbols scattered in a second regularly spaced pattern offset from said first regularly spaced pattern in each second pair of OFDM symbols; and

inserting such blocks of two sub-carriers by two OFDM symbols scattered in a third regularly spaced pattern offset from said second regularly spaced pattern in each third pair of OFDM symbols.

58. (Previously presented) The method of claim 1 wherein pilots are inserted for the four transmit antennas collectively in blocks of two sub-carriers by two OFDM symbols scattered in time and frequency in a repeating pattern of OFDM symbols that is a multiple of two OFDM symbols in length.

59. (Previously presented) The method of claim 1 further comprising:

transmitting pilots with a power higher than average power.

60. (Previously presented) The method of claim 59 wherein data and pilots are transmitted using QPSK, with the pilots being transmitted with a relative power boost.

61. (Previously presented) The method of claim 59 wherein data is transmitted using a QAM constellation, and pilots are transmitted using QPSK with signal constellation points at corners of the QAM constellation.

62. (Previously presented) The method of claim 1 further comprising:

transmitting relatively reliable signalling channel information proximal in time and frequency to locations of pilots.

63. (Previously presented) The method of claim 62 wherein transmitting relatively reliable signalling channel information proximal in time and frequency to locations of pilots comprises:

for pairs of antennas of the four transmit antennas, transmitting space time coded signalling channel information pairs adjacent in time to pairs of pilots.

64. (Previously presented) The method of claim 1 wherein for a given antenna, a spacing between pilots in the time direction is determined with consideration to the maximum Doppler frequency, while a spacing between pilots in the frequency direction is determined with consideration to a delay spread of multi-path fading.

65. (Previously presented) The method of claim 1 further comprising turning off two transmit antennas and re-assigning pilot groups assigned to the turned off antennas to the remaining two transmit antennas to improve the channel estimation performance for fast frequency selective fading channel.

66. (Previously presented) The method of claim 1 wherein the four transmit antennas form part of a single base station transceiver.

67. (Previously presented) The method of claim 1 wherein the four transmit antennas form part of multiple base station transceivers.

68. (Previously presented) The method of claim 1 wherein the four transmit antennas form part of multiple mobile stations.

69. (Previously presented) The method of claim 1 wherein the pilots are space-time coded.

70. (Previously presented) The method of claim 1 wherein the pilots are space-frequency coded.

71. (Previously presented) The method of claim 1 wherein the pilots are space-time-frequency coded.

72. (Previously presented) The method of claim 1 wherein the pilots are uncoded.

73. (Previously presented) At least two mobile stations collectively comprising four transmit antennas, the at least two mobile stations adapted to implement the method of claim 1.

Appl. No. 10/593,053

**Evidence Appendix**

None



Appl. No. 10/593,053

**Related Proceedings Appendix**

None